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Perceived Ethnic Discrimination in Relation to Daily Moods and Negative Social Interactions

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Ethnic discrimination experienced in an interpersonal context has been identified as a stressor contributing to racial disparities in health. Exposure to racism may influence the way people view their ongoing experiences, making it more likely that individuals will appraise new situations as threatening and harmful, adding to their overall stress burden. A multiethnic sample of 113 adults completed a diary page every 30 min for one day. The diary inquired about moods and perceptions of social interactions. When controlling for personality characteristics, mixed models regression analyses indicated that baseline measures of ethnic discrimination (assessed with the Perceived Ethnic Discrimination Scale-Community Version) were positively associated with daily levels of anger and the intensity of participants' rating of routine social interactions as harassing, exclusionary, and unfair. These findings have implications for models of the contribution of psychosocial factors to racial disparities in health.

KEY WORDS: racism; mood; social interaction; ethnicity-related stress; appraisals.

Racial disparities in health status are well documented and a matter of serious national concern (National Heart Lung and Blood Institute, 2000). Racism, or ethnic discrimination, has been identified as one of the potential stressors that may contribute to racial and ethnic disparities in health (Anderson and Armstead, 1995; Anderson *et al.*, 1991; Brondolo *et al.*, 2003b; National Heart Lung and Blood Institute, 2000; National Institute of Health, 2000; Williams and Collins, 1995). However, the mechanisms through which racism may contribute to increased health risk remain unclear.

Racism has been defined as "the beliefs, attitudes, institutional arrangements, and acts that tend to denigrate individuals or groups because of phenotypic characteristics or ethnic group affiliation" (Clark *et al.*, 1999). The more general term, ethnic discrimination, has been defined as unfair treatment received because of one's ethnicity (Contrada *et al.*, 2000). Interpersonal aspects of racism/ethnic discrimination may be distinguished from its institutional forms.[5] Interpersonal racism has been defined as "directly perceived discriminatory interactions between individuals whether in their institutional roles or as public and private individuals" (Krieger, 1999).

Recently, researchers have begun to investigate the health effects of racism using the stress and coping framework developed by Lazarus and Folkman (Brondolo *et al.*, 2003b; Clark *et al.*, 1999;

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[5]There is little consensus on the best terms to use to distinguish among groups based on phenotypic or cultural characteristics, and both scientific and political factors influence the debate. Some groups (i.e., Blacks) have been considered 'racial' groups despite the lack of biological evidence for distinct races; whereas others (i.e., Latinos) are considered ethnic groups, but have also had their ethnicity referred to as a "race." In this paper, we have chosen to use the terms "race" and "ethnicity" and "racism" and "ethnic discrimination" interchangeably. In addition, we used the term "African descent" because the Black sample included both US- and foreign-born participants.

Outlaw, 1993). Ethnic discrimination may be associated with increased stress exposure through two pathways. First, acute episodes of discrimination may occur repeatedly, with each event requiring coping efforts and consequently taxing coping resources. Therefore, common, everyday forms of ethnic discrimination, including ethnicity-related social rejection or exclusion, could occur sufficiently frequently to be considered a chronic stressor (Contrada *et al.*, 2001; Feagin, 1991; Swim *et al.*, 1995). Research has indicated that members of many minority groups in the United States face continuing prejudice and discrimination in their daily lives (Al-Issa and Tousignant, 1997; Essed, 1990; Feagin and Sikes, 1994; Landrine and Klonoff, 1996).

Second, ethnic discrimination may contribute to chronic stress by changing the way people view their ongoing experiences. Specifically, past exposure to discrimination may make people more likely to appraise new situations as potentially threatening and harmful (Brondolo *et al.*, 2005b). In the case of social interactions, ambiguous interactions may be more likely to be interpreted as harmful and engender negative feelings (Chen and Matthews, 2001; Gallo and Matthews, 2003; Gallo *et al.*, 2005; Gump and Matthews, 1999). Therefore, past discrimination may result in more frequent and more intense exposure to negative interpersonal interactions on an ongoing basis. Our research and that of many others have documented the effects of negative social interactions on cardiovascular response (Brondolo *et al.*, 2003a; Brondo, Karlin, Alexander, Bobrow, Schwartz 1999; Lynch *et al.*, 1980; Lynch, 1985).

Interpersonal racism may have effects that extend beyond those associated with social interactions. Gallo and Matthews (2003) propose the Reserve Capacity Model to formulate the ways in which social stressors may influence health status. The original formulation of this model focused on the effects of socioeconomic status on health, but the model is also applicable to the study of racism. Together the stressors associated with discrimination, including a potential increase in negative social interactions may require greater use of tangible and psychological coping resources. They suggest that this combination of greater stress exposure coupled with diminished coping resources culminates in chronically higher levels of negative affect and lower levels of positive affect. In turn, both acute and chronic experiences of negative affectivity have been demonstrated to increase risk for cardiovascular and other diseases through a variety of pathophysiological mechanisms (Whiteman *et al.*, 2000; Suls and Bunde, 2005; Rozanski *et al.*, 1999).

Research evaluating the hypothesis that racism or ethnic discrimination acts as a chronic stressor has come from a variety of sources. Some research has sought to demonstrate that racism is a stressor by examining the hypothesized consequences of exposure, including distress and stress-related health problems in several different targeted ethnic groups. Epidemiological studies consistently suggest a link between exposure to ethnic discrimination and diagnosed mental illness (Burke, 1984; Carter, 1994; Louden, 1995; Watts, 2002), mental health complaints (Gee, 2002; Kessler *et al.*, 1999), and symptoms of anxiety, depression and hostility (Bowen-Reid and Harrell, 2002; Cassidy *et al.*, 2004; Karlsen and Nazroo, 2002; Karlsen *et al.*, 2005; Klonoff and Landrine, 1999; Landrine and Klonoff, 1996; Noh and Kaspar, 2003; Ren *et al.*, 1999). The available evidence also consistently supports a relationship between perceived racism and negative affect, including feelings of anger and sadness (Appel, 2004; Bennett *et al.*, 2004; Swim *et al.*, 2003). Studies on the health consequences of racism have been more mixed, in part as a function of methodological problems common to a new area of research (Brondolo *et al.*, 2003b). However, more recent work suggests that exposure to racism is associated with several stress-related disorders or cardiovascular risk factors, including some cardiovascular conditions, low birthweight, and ambulatory blood pressure (Collins *et al.*, 2004; Din-Dzietham *et al.*, 2004; Steffen *et al.*, 2003; Troxel *et al.*, 2003).

Laboratory studies have been used to examine the degree to which exposure to ethnic discrimination influences perceptions of and physiological responses to new stressors (e.g. public speaking) (Guyll *et al.*, 2001). Several studies reveal that past exposure to racism is associated with increased cardiovascular reactivity to laboratory stressors, including those with and without an ethnic discrimination component (Clark, 2000; Guyll *et al.*, 2001). These findings suggest that past maltreatment potentially influences perception of and response to current stress exposure.

When ethnic discrimination and symptoms and moods are assessed at the same time using retrospective questionnaires or interviews, interpretation of the findings may be limited by the difficulties associated with common method variance and recall bias. Specifically, it can be difficult to determine if features of the individual's personality, environment, or

current psychological state account for both reports of discriminatory treatment and reports of moods and symptoms (Stone and Shiffman, 1994, 2002). There are also limitations to the interpretability and generalizability of laboratory findings, since the degree to which responses to laboratory stressors correspond to responses to "real-life" stressors remains unclear (Schwartz *et al.*, 2003).

New methods of measurement are necessary to minimize the limitations of self-report questionnaires. Ecological Momentary Assessment (EMA) is a method that can be used to provide a more detailed understanding of the ways in which exposure to racism acts as a stressor through its association with daily affective and interpersonal experiences. These diary-based procedures can yield data that are more reliable, more representative of actual experience, and relatively free of retrospective bias (Stone and Shiffman, 1994, 2002). Although there have been diary-based studies of the incidence of racist interactions in everyday life (Swim *et al.*, 1998), to our knowledge, there has been only one published study that has examined the relationship of past exposure to racism to current mood state or interpersonal interactions using EMA methods (Taylor *et al.*, 2004). Data on the daily correlates of racism are necessary to understand the pathways through which racism may influence physical and mental health.

Prior research on the relationship of ethnic discrimination to mood (Landrine and Klonoff, 1996) and symptoms (Jackson *et al.*, 1996; Kessler *et al.*, 1999) has not yet fully explored the effects of personality variables that may influence reports of both exposure to racism and its psychological and physical sequelae. It is not yet known if exposure to ethnic discrimination influences personality development, or if personality influences reports of ethnic discrimination. Researchers have suggested that chronic stressors, such as racism or poverty, influence the development of personality styles such as hostility or defensiveness, and that the effects of racism are mediated through these changes in personality (Phinney *et al.*, 1998). Personality characteristics such as hostility or anger may increase both the likelihood that interactions will be perceived as hostile and the experience of distress associated with the interaction (Brondolo *et al.*, 2003a; Jamner *et al.*, 1993). Therefore, to disentangle the effects of individual differences in personality from the effects of an environmental stressor such as interpersonal ethnic discrimination, it is necessary to control for defensiveness which may minimize reports of exposure to discrimination and for the effects of hostility, cynicism, and anxiety, all of which may increase reports of negative mood and social interactions (Jamner *et al.*, 1991; Shapiro *et al.*, 1997).

Accordingly, this study was designed to evaluate the mechanisms through which racism or ethnic discrimination could serve as a chronic stressor, potentially affecting health outcomes over the long term. In the present study we explicitly tested the hypothesis that exposure to perceived racism would produce changes in perceptions about the self and others that would generalize across situations and individuals. Therefore, we considered mood during all daily activities and perceptions of all social interactions, independent of the ethnicity of the other person or the nature of the interaction. To begin to determine if there are ethnic-group variations in the daily correlates of racism, we worked with a community sample that was predominantly comprised of two ethnic groups: Blacks and Latinos. Research suggests that, in the U.S., Latinos, like Blacks are targets of ethnic discrimination (Schneider *et al.*, 2000).

METHOD

Overview and Procedure

One White and one Black graduate student approached patients and staff in three primary care practices (PCP) that were located in the outer boroughs of New York City. These PCPs were associated with Clinical Directors Network (CDN), whose member C/MHCs provide comprehensive and accessible community-oriented health care services and clinical research opportunities for poor, minority, and underserved populations. Patients were approached in the waiting room, and staff were approached at their work stations. The use of patients and staff permitted us to sample individuals from a broad range of socioeconomic status. Volunteers were asked to participate in a diary study of daily stress, and told that their participation would involve completing a series of questionnaires and one day of diary recordings.

Once the informed consent was reviewed and signed, participants completed a brief survey inquiring about demographic characteristics. Next, they were shown how to use the ambulatory diary that was fitted with a small electronic timer preprogrammed to "beep" every 30 min (the ePill™ Timer). Participants completed one diary page every time the

timer signaled them throughout the course of one day until they went to sleep. If they were unable to complete a page when they were prompted, they were instructed to leave the remaining items blank and to begin a new page at the next prompt. Participants practiced role playing different situations and completing sample diary pages with the research assistant until they felt comfortable completing the diary pages on their own. Participants began completing diary pages in the morning of the testing day and were asked to continue until bedtime, with most beginning before 11 am and ending by 11 pm. They were provided with a Metrocard (worth about $4) to facilitate their return to the PCP. Participants were paid $25 for completion of the questionnaires and diary.

Participants

Participants were included if they were between the ages of 18 and 65, were English speaking, and were able to return to the PCP the next day to hand back the equipment and participate in interviews. Sixty-percent of the total number of individuals approached at the PCP's volunteered for the study, yielding an initial sample of 120. Of these, six participants did not return the following day and one was unable to complete the diary. The demographic characteristics of the 7 dropouts were not significantly different from the remaining 113 participants.

The 113 participants who completed the full protocol included 34 men (30%) and 79 women. Forty-five identified themselves as Black, 40 as Latino, 13 as White, 1 as East Asian, 3 as West Asian, 1 as Native American, and the remainder regarded themselves as having a mixed ethnic identity. Mean age was 35.3 years (SD = 10.8; Range = 18–60 years). The majority of participants were born in the US (66%). Thirty-nine percent of the sample was staff of the medical centers, while the remaining 61% was patients. Consequently, the participants came from a wide range of educational levels. Twenty-two had less than a high school education, 29 had completed high school or obtained a GED, 47 had attended some college, 7 had completed college, and 6 had additional graduate education. The median income of the sample was $28,957. Individuals in the lowest income quartile had an average income of $2,728, whereas those in the top quartile had an average income of $61,230. Forty-seven participants were single, 49 were married or living with someone, and the remainder were divorced, widowed or separated.

Measures

Demographics Form

A brief demographics questionnaire was administered to obtain information on gender, age, marital status, household composition, place of birth, years in the United States, household income, living arrangements, ethnic background, highest level of education, and employment status.

Perceived-Ethnic Discrimination Scale-Community Version

The PEDQ-Community Version (PEDQ-CV) contains a 34-item measure assessing lifetime experiences of ethnic discrimination within a social or interpersonal context (Brondolo *et al.*, 2005a). The items assess various dimensions of interpersonal ethnic discrimination including exposure to ethnicity-related stigmatization, social distancing, discrimination at work, and threat or aggression. This scale is a modification of the PEDQ-Revised B, developed by Contrada and colleagues (Contrada *et al.*, 2001) to assess perceived exposure to ethnic discrimination in college students from any ethnic/racial background. To develop the community version, the original items were phrased in simpler language and modified to reflect the everyday experiences of community-dwelling adults. The scale was then tested with a sample of community members from a variety of educational and ethnic backgrounds (Brondolo *et al.*, 2005a). The community-version is designed to be used with any ethnic group and has been validated for use with Latino and Black samples. The scale also has been shown to be reliable with both student and community-dwelling adult samples.

On the first page of the PEDQ-CV, participants indicate their ethnicity or race. The remainder of the questions of the full PEDQ begin with the statement: "Because of my ethnicity/race … " and are followed by an item describing exposure to some form of mistreatment or difficulty (e.g., " … a clerk or waiter ignored me."). Participants were asked to indicate how often they had ever "had these experiences during their lifetime," and each item was rated on a 5-point Likert-type scale,

with a response of 1 indicating that the event "never happened" and a response of 5 indicating the event "happened very often." The full scale has excellent psychometric properties with an internal consistency in the present sample of 0.95, and there is strong preliminary evidence of the construct validity of the lifetime exposure scale (Brondolo *et al.*, 2005a).

Social Interactions and Mood

An ambulatory monitoring diary was used to collect information about social interactions and mood. The diary was a small bound notebook with pre-printed pages and an ePill(TM) timer attached to the front cover. The diary contained questions about the participants' feelings and social interactions at the time they were signaled. Most items in the diary were accompanied by visual icons to facilitate comprehension. Consultants in the Art Department at St. John's University created the icons. Pilot studies conducted with 23 participants from one community-based PCP site using an initial version of the diary revealed that participants from a wide range of educational levels and cultural backgrounds were easily able to understand and complete the diary, finishing over 90% of the pages assigned.

Emotions (e.g. happy, relaxed, nervous, sad, angry) were depicted using icons portraying different facial expressions next to the name of the emotion. Lodge (1965) has suggested that magnitude estimation procedures are more sensitive than Likert-type scaling to variations in the intensity of subjective ratings. Therefore, we used a visual analogue scale to obtain ratings of mood intensity. Participants made a mark along a 9 cm. line, with a mark at 4.5 cm indicating an intensity rating of 50. Additional items asked if the participants were talking at the time they were signaled by the timer and about the identity of the person(s) with whom they were interacting (i.e., family member, co-worker, etc.). If they were interacting, participants were asked to complete items describing the quality of the interaction, with icons illustrating perceptions of being excluded, treated unfairly, or harassed, or feeling comfortable. The social interaction diary items reflect the types of ethnic discrimination reported in the literature (Feagin, 1991). A seven-centimeter line next to the icon was used to allow participants to indicate the degree to which they experienced that perception (rated on a scale from 1–100).

Psychological Control Variables

Anxiety

Trait anxiety was measured using the Taylor Manifest Anxiety Scale (Taylor, 1953). The 20 item short form (Bendig version) was administered, which correlates 0.91 with the full Taylor Manifest Anxiety Scale. The scale has an internal consistency reliability of 0.76 according to prior research.

Defensiveness

Defensiveness has been measured in many research studies by administering the Marlowe-Crowne Social Desirability Scale (Crowne and Marlowe, 1960). The Marlowe-Crowne is a 33-item, true-false, self-report scale used to measure the need of participants to respond to test items in culturally sanctioned ways. It has been shown to have internal consistencies of 0.71 for males and 0.72 for females (O'Grady, 1988), up to 0.88 for males and females together (Crowne and Marlowe, 1960), and test-retest reliability of 0.89 at a one-month interval (Crowne and Marlowe, 1960).

Cynicism and Hostility

Hostile attributions and cynicism were measured with the Hostile Attribution and Cynicism subscales of the MMPI-based Cook and Medley Hostility scale (Ho) that were developed by Barefoot and colleagues (1989). The hostile attribution subscale reflects a tendency to interpret the behavior of others as intended to harm the respondent as reflected in suspicion, paranoia, and fear of threat to the self. Cynicism represents a general negative view of the world and of people as being unworthy, deceitful, and selfish. Barefoot *et al.* (1989) demonstrated the convergent and discriminant validity of these subsets. Participants responded to the measure on a six-point scale indicating the extent to which they agreed with each item as in several previous studies (Contrada and Jussim, 1992).

Analytic Plan

To test the main hypotheses of the study, we employed mixed models regression analyses estimated

using PROC Mixed, a procedure developed by the SAS Institute (Littell *et al.*, 1996). As we and others have discussed elsewhere, (Bagiella *et al.*, 2000; Brondolo *et al.*, 1999a,b; Schwartz and Stone, 1998), in comparison to standard repeated measures or regression analyses, these mixed models offer a more efficient and potentially more powerful strategy for significance testing when using EMA in which individuals may have different numbers of completed observations. In this study, Proc Mixed analyses permitted us to ask questions about the between-person relationships among variables (e.g., Are individual differences in perceived exposure to ethnic discrimination associated with individual differences in mood and in perceptions of social interactions assessed repeatedly over the course of the day?). The independent variable was lifetime PEDQ-CV score. Scores for daily mood (angry, happy, nervous, relaxed, and sad), and perceptions of social interaction (feeling comfortable, feeling treated unfairly, feeling harassed, and feeling ignored), served as dependent variables in a series of analyses.

Analyses were performed using three variance structures: compound symmetry alone, autoregression alone, and compound symmetry plus serial autocorrelation, using the sp(pow) procedure from SAS. Because the estimated autocorrelation was statistically significant in each case, and the combination of compound symmetry and autoregressive error structures produced a better fit than compound symmetry alone, the combined compound symmetry and autoregressive error structures were used in all analyses. Therefore, the F and p values reported for the within-person analyses were those obtained after specifying the combined error structure. Unstandardized estimates are reported for each analysis to facilitate evaluation of effect sizes.

RESULTS

Measure of Discrimination

Mean levels of lifetime exposure to ethnic discrimination (Mean = 2.01, SD = 0.67, Range 1–4.5) are comparable to those reported in other studies employing these or similar scales (Brondolo *et al.*, 2005a).

Diary Data

Participants completed an average of 23 diary entries per day (SD = 4.3, Range 8–32), Participants indicated they were accompanied by others on an average of 19 of the diary readings. On average, participants indicated that they were talking during 14.34 observations (SD = 9.70, Range 1–29). The social interaction items (i.e., comfortable, harassed, unfairly treated, or excluded) were only included in analyses if the participant indicated that he or she was involved in an interaction at the time of the diary reading. Participants were regarded as interacting if they responded "yes" to an item that inquired if they were talking at the time of the diary reading or if they indicated they were with another person at the time of the diary reading.

Demographic Variations

Gender

There were no gender differences in age ($p > 0.27$), but there were significant differences among the three major ethnic groups (Black, Latino, White) in the ratio of men to women ($X^2 = 6.36$, $p < 0.05$). Specifically, the ratio of men to women was higher for Blacks (20:25) than for Whites (3:10) or Latinos (8:32).

ANOVAs were employed to test gender differences in exposure to racism. Proc Mixed was used to examine gender differences in diary items. There were no gender differences in PEDQ-CV scores ($p > 0.11$) or in response to any of the diary items assessing emotion or the degree to which participants perceived the social interactions as comfortable, harassing (all $ps > 0.18$), or exclusionary ($p > 0.05$). Men and women differed in the degree to which they perceived interactions as unfair ($F(1, 110) = 7.33$, $p \leq 0.01$), with men (M = 12.50, SE = 2.00) reporting significantly higher levels of unfair treatment than did women (M = 6.04, SE = 1.31).

Age

Age was unrelated to lifetime exposure to racism ($ps > 0.40$). Proc Mixed analyses indicated that there were no relationships of age to any of the diary items.

Race/Ethnicity

Analyses included only those self-identified as Black, Latino, or White as there were too few members of other groups (i.e., Asian, Native American, etc.) to permit comparisons. Although Blacks ($n = 49$, $M = 2.05$ ($SD = 0.65$) and Latinos ($n = 43$, $M = 2.11$, $SD = 0.73$) reported higher levels of exposure to racism than did Whites ($n = 14$, $M = 1.67$, $SD = 0.54$), the effects did not reach significance ($ps < 0.11$). The effects remained non-significant when controlling for gender.

There were significant ethnic group differences in diary ratings of some daily moods, but no ethnic group differences in ratings of social interactions (all $ps > 0.50$). Blacks (adjusted $M = 6.88$, $SE = 1.91$) reported feeling less nervous than Latinos (adjusted $M = 11.63$, $SE = 2.05$) or Whites (adjusted $M = 15.98$, $SE = 3.61$; ($F(2,102) = 3.02$, $p < 0.05$). Similarly Blacks (adjusted $M = 5.68$, $SE = 1.97$) and Latinos (adjusted $M = 9.77$, $SE = 2.13$) felt less sad than Whites (adjusted $M = 20.16$, $SE = 3.72$; $F(1,102) = 5.97$, $p < 0.01$). There were no between-groups differences in reports of happiness ($p > 0.09$), anger ($p > 0.19$) or relaxation ($p > 0.19$). None of the effects changed in significance when gender was added as a control variable.

Place of Birth

We and others have documented differences between American-born and foreign-born individuals in their perceptions of ethnic discrimination (Brondolo *et al.*, 2005a; Ogbu, 2002), although not all have found this effect (Phinney *et al.*, 1998). In this study, 30 participants were born outside the United States (primarily in the West Indies). American-born individuals ($n = 75$, $M = 2.10$, $SD = 0.73$) displayed a trend toward reporting higher levels of exposure to racism than did foreign-born individuals ($M = 1.84$ $SD = 0.54$; $F(1,103) = 3.16$, $p < 0.08$). Place of birth was significantly associated with diary ratings of anger ($F(1,103) = 4.16$, $p < 0.05$). American-born participants (adjusted $M = 14.56$, $SE = 1.6$) reported substantially higher levels of anger than did foreign-born participants ($M = 8.39$, $SE = 2.6$). No other place of birth effects for diary items were significant (all $ps >$ 0.18–0.89).

Education

The sample was divided into two groups, with 46% belonging to the relatively low education group (including those with a high school diploma or less education) and 53% assigned to the relatively high education group (including those who had attended at least some college). There were no significant effects of education on lifetime exposure to racism ($ps > 0.29$), and there was no significant relationship of education level to any of the diary items ($ps > 0.12$–0.98).

Gross Household Income (GHI)

There were no significant relations of GHI to lifetime perceived racism. There was no significant relation of GHI to any diary item ($ps > 0.18$–0.81), with the exception of a trend for income to be negatively associated with the perception of being ignored in social interactions ($p < 0.10$).

As we were specifically interested in identifying the unique effects of perceived racism on daily interactions controlling for the influence of other potential stressors theoretically related to both the independent and dependent variables (i.e. gender, immigration status, income-related variables), we chose a more liberal significance value (i.e., $p < 0.10$) when evaluating potential covariates for inclusion in the primary study analyses. Consequently, we include gender, ethnicity, place of birth and gross household income as control variables. Information on all covariates was not available for all participants therefore the analysis was performed on 91 individuals. However, the direction and magnitude of the significant effects for each analysis of mood and social interaction was not substantially different when the analyses were repeated using the full sample and with no covariates included.

Relations among the Dependent Variables Including Diary Measures of Negative Mood and Perceptions of Social Interaction

As the quality of social interactions may influence mood, Proc Mixed was employed to evaluate the relationships of diary ratings of social interactions to diary ratings of negative mood (e.g., when participants perceived interactions as harassing, exclusionary or unfair did they also rate their mood as

more angry, sad or nervous?). Responses to the diary items measuring unfair, exclusionary, and harassing treatment were entered as predictor variables, and each was treated as a random effect. Three separate analyses were performed, once for each diary measure of negative mood (i.e., anger, sadness, and nervousness). Perceptions of harassment ($B = 0.33$, $SE = 0.03$, $df = 1976$, $t = 9.51$, $p < 0.0001$) and unfair treatment ($B = 0.39$, SE $= 0.03$, $df = 1976$, $t = 12.78$, $p < 0.0001$) were related to ratings of anger. Perceptions of exclusionary ($B = 0.15$, $SE = 0.07$, $df = 1961$, $t = 2.07$, $p < 0.05$) and unfair ($B = 0.26$, $SE = 0.06$, $df = 1961$, $t = 4.64$, $p < 0.0001$) treatment were related to ratings of sadness. Perceptions of harassment ($B = 0.17$, $SE = 0.06$, $df = 1982$, $t = 2.71$, $p < 0.01$) were related to ratings of nervousness.

Table I. Mixed Models Analyses of the Relationship of Perceived Ethnic Discrimination to Diary Rating of Mood and Social Interactions While Controlling for Gender, Ethnicity/Race, Place of Birth and Income ($n = 91$)

	Relationship with perceived ethnic discrimination		
Variable	Parameter estimate	Standard error	T
Mood items			
Angry	8.53	2.06	4.15**
Sad	5.67	2.20	2.58*
Nervous	6.63	2.25	2.95*
Social interaction items			
Harassed	4.55	1.22	3.73**
Ignored	5.01	1.37	3.66**
Treated Unfairly	5.50	1.76	3.12*

*$p < 0.05$; **$p < 0.0005$.

The Relationship of Perceived Ethnic Discrimination to Diary Measures of Mood

Proc Mixed was employed to evaluate the relationship of ethnic discrimination to daily diary measures of anger, sadness, nervousness, happiness and relaxation.[6] Analyses were performed separately for each mood since the alpha for the negative mood scale comprised of the items sad, angry, and nervous ($\alpha = 0.61$) was relatively low and the highest correlation among two items was 0.42.

As seen in Table I, ethnic discrimination was significantly associated with daily diary ratings of anger, sadness, and nervousness. The findings for happiness ($p > 0.21$) and relaxation ($p > 0.37$) were in the opposite direction, but were not significant.

Perceived Discrimination and Social Interactions

Proc Mixed was employed to evaluate the relationship of interpersonal ethnic discrimination to daily diary measures of perceptions of interactions as comfortable, exclusionary, unfair or harassing. The use of covariates and the analytic strategies were identical to those used to examine the effects of racism on mood. Only those observations in which interactions occurred were included in the analysis. As seen in Table I, ethnic discrimination was positively related to perceptions of being harassed, ignored, and treated unfairly and was unrelated to perceptions of being comfortable ($p > 0.34$).

Personality Measures: Are the Effects of Racism on Mood and Social Interactions a Function of Personality?

Across the sample ($n = 113$), ethnic discrimination was positively associated with cynicism ($r = 0.39$, $p < 0.001$), hostile attributions ($r = 0.34$, $p < 0.001$), and trait anxiety ($r = 0.38$, $p < 0.001$) and was negatively associated with defensiveness ($r = -0.37$, $p < 0.001$). Regression analyses with all four personality measures serving as predictors revealed that cynicism was significantly positively correlated and defensiveness was significantly negatively correlated with ethnic discrimination. The four personality measures were also associated with diary measures of mood and social interactions. Specifically, Proc Mixed analyses reveal that scores on the cynicism subscale were positively associated with anger and sadness, as well as perceptions of harassing, exclusionary and unfair treatment (all $ps < 0.05$). Similarly, scores on the hostile attributions subscale and the trait anxiety scale were positively associated with all three mood and all three social interaction items (all $ps < 0.05$). Defensiveness was not significantly related to any of the diary measures ($ps > 0.08$). With all four personality measures included as predictors simultaneously, trait anxiety is the only variable to predict each of the mood and social interaction items (all $ps < 0.05$).

[6] As the initial analyses indicated that the primary differences in mood distinguished Whites from Blacks or Latinos, ethnicity was dummy coded as one variable (White) with two levels (yes or no).

To determine if the relationship of racism to diary measures is a function of personality, the analyses were repeated with the four personality measures included as covariates. Ethnic discrimination remained significantly and positively related to anger ($B = 6.18$, $SE = 2.35$, $df = 76$, $t = 2.63$, $p < 0.02$), but not sadness or nervousness. For sadness, controlling for trait anxiety and cynicism eliminates the effects of ethnic discrimination. For nervousness, controlling for trait anxiety eliminate the effects of ethnic discrimination. With the four personality measures in the model, the effects of ethnic discrimination on perceptions of being harassed ($B = 3.12$, $SE = 1.42$, $df = 75$, $t = 2.19$, $p < 0.04$), and perceptions of being ignored ($B = 3.32$, $SE = 1.63$, $df = 76$, $t = 2.03$, $p < 0.05$) remained significant. For unfair treatment, controlling for the effects of trait anxiety eliminates the effects of ethnic discrimination.

Moderating Effects of Ethnicity

To determine if these relationships were similar for individuals of African and Latino descent, as these were the two largest sub-groups, we examined the interaction of ethnicity (African descent vs. Latino descent) with racism. Covariates were identical to those used in prior analyses, with the exception of the ethnicity term. Instead ethnicity (African descent vs. Latino descent) was included both as a main effect and in the interaction term. None of the interactions of ethnicity and perceived racism were significant ($ps > 0.06$).

DISCUSSION

The effects of ethnic discrimination on moods and social interactions were tested within the stress and coping framework proposed by Lazarus and Folkman (1984) and extended by Clark and others (Clark *et al.*, 1999). This model suggests that racism may affect health by serving as a stressor eliciting sustained demands for coping. Recently, Gallo and Matthews (2003) have suggested that social factors (i.e., racism, poverty, immigration) may add to the cumulative stress burden by influencing appraisals of ongoing social interactions. These social factors increase the likelihood of perceiving current interactions as potentially negative and distressing (Gallo and Matthews, 2003; Gallo *et al.*, 2005). This study is among the first to explicitly test hypotheses about the relationship of racism to daily mood and social interactions using ecological momentary assessments.

The findings from this study provide support for this model and suggest that ethnic discrimination is associated with higher levels of negative mood and more intensely negative social interactions. Specifically, higher levels of exposure to ethnic discrimination were associated with higher levels of anger, sadness and nervousness throughout the day and a greater likelihood of perceiving routine social interactions as harassing or exclusionary.

The effects of ethnic discrimination on mood and social interactions are not simply a function of personality. Ethnic discrimination was associated with higher levels of cynicism, hostility, anxiety and lower levels of defensiveness. However, even when the effects of these four personality variables are controlled, the relationship of discrimination to daily ratings of anger and perceptions of harassing or exclusionary treatment remain significant. In those cases in which ethnic discrimination was no longer associated with mood or perceptions of unfair treatment, it was trait anxiety, not hostility or cynicism that accounted for the effects. This suggests that the effects of ethnic discrimination on mood and social interactions are not a function of underlying schemas about the nature of the world or the behavior of others (i.e., cynicism or hostile attributions). Instead the effects are partly accounted for by anxiety, a characteristic that is as likely to be caused by discrimination as to determine its consequences.

These findings are consistent with narratives from qualitative studies describing experiences with race-related isolation and distress (Essed, 1990, 1991; Feagin, 1991; Feagin and Sikes, 1994). They provide support for the notion that racism acts as a stressor through several pathways. Exposure to ethnic discrimination appears to generate sustained and elevated levels of anger, independent of personality style. The requirement to cope with anger on a daily basis may tax available coping resources. Second, lifetime exposure to ethnic discrimination is associated with more intensely negative interpersonal interactions. Individuals who have been exposed to racism in the past may be more likely to encounter ongoing interpersonal conflict or they may be more likely to perceive interactions as conflictual. These negative interactions will require both emotion-focused coping efforts to manage the distress and problem-focused coping to resolve the interpersonal problems.

These ideas are consistent with Gallo and Matthews' (2003) Reserve Capacity model of the health effects of another social stressor, low socioeconomic status. The authors suggest that low socioeconomic status increases negative mood and influences perceptions of social interactions, making it more likely that interactions are perceived as negative and conflicted. These interpersonal interactions increase stress exposure, deplete coping resources, and consequently impair health.

The literature on mood and ambulatory blood pressure (ABP) suggests that negative moods are associated with increases in blood pressure (Kamarck *et al.*, 2005a,b). Our prior work, using similar ecological momentary assessment methodology (Brondolo *et al.*, 2003a), demonstrates that social interactions are associated with increases in ABP, and that the magnitude of the blood pressure response is associated with the intensity of interaction-related distress. Thus, experiences with discrimination may contribute to the development of hypertension by influencing daily psychosocial functioning. We are currently examining this hypothesis in a large community-based study.

Limitations of the Present Study

The data are not prospective and, therefore, causal inferences cannot be drawn. As past experiences with ethnic discrimination can lead to everyday changes in mood and negative interactions, these changes in mood and negative interactions can also influence the recollection of past experiences. However, the findings are strengthened by the methodology. Diary data are collected over the course of the day—rather than at the same time as the questionnaire measure of discrimination are completed. It is encouraging that these relationships remain significant when psychological control variables such as hostile attributions, cynicism, trait anxiety, and defensiveness are entered into the model. Attributions were not adequately measured and, therefore, it is unclear whether the daily stressors participants faced were attributed to ethnic discrimination or to other factors. Similarly, it is not possible to determine if individuals were actually experiencing interpersonal maltreatment or if they simply perceived others as acting in a negative manner. However, the fact that the major effects remain significant with personality variables controlled suggests that the effects are specific to exposure to discrimination as a stressor, rather than a more general tendency to view other people's behavior in a negative light. Although four personality factors were measured, additional factors that may have influenced the data were not measured.

The findings on ethnic group comparisons are based on small and heterogeneous samples, including both foreign and American-born individuals from a range of ethnic and socioeconomic backgrounds. However, it is worth noting that the relationship of perceived racism to daily mood and social interactions did not significantly differ between Blacks and Latinos, our two main groups. These data suggest that the proposed stress and coping model may generalize across the two ethnic groups tested in this sample. Given the limitations of our sample, it is worth studying these ethnic differences in a larger sample capable of elucidating any cultural, SES, or gender factors that may also influence these relationships.

In addition, although the participants came from a range of educational and economic backgrounds, overall the income of the sample was relatively low. This may limit the generalizability of the findings. However, in this sample perceived discrimination was not related to income, and the effects of perceived ethnic discrimination on mood and social interaction persist even when controlling for income. In addition, there may be limits to the generalizability of the findings, as the sample was drawn from medical centers and may not be representative of all the people who live in surrounding communities.

As cautioned by Stone and Shiffman (2002) "the validity of the assessment scheme is threatened by noncompliance" (p. 240). Because a paper and pencil diary was used, it was difficult to accurately measure compliance rates. However, in our previous studies using paper and pencil diaries with single day protocols and follow-up interviews, the data have suggested that participants were compliant in responding to the instructions.

Summary and Conclusion

These data provide empirical evidence that past exposure to perceived ethnic discrimination is associated with daily negative social interactions and negative mood. The analyses indicate that the association of racism to daily experience is not simply a function of personality traits or SES, factors known to be associated with both racism and negative mood.

These data support accumulating evidence that measures of daily experiences add an important dimension to the assessment of the psychosocial stress beyond that captured by traditional personality measures known to be associated with health status (Kamarck *et al.*, 2005a,b). The diary data provide a detailed picture of daily psychosocial stress that may inform future treatment-related studies analyzing the effects of perceived ethnic discrimination on health outcomes.

Mood may mediate the relationship of racism to social interactions. Alternatively, the relationship of racism to mood may be mediated by negative social interactions. In a cross sectional, small sample study we cannot determine the direction of effects, (i.e., specify if negative mood influences social interactions or if negative social interactions engender persistent negative mood). There may be a complex interplay between daily mood and the quality of social interactions. Identifying the specific pathways through which racism affects mood and potentially undermines social interactions is an important topic for future research.

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